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09/915,936	07/25/2001	Kouji Kurosaki	IIW-006	8248

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LAHIVE & COCKFIELD
28 STATE STREET
BOSTON, MA 02109

EXAMINER	
WALKER, KEITH D	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/915,936	KUROSAKI ET AL.	
	Examiner	Art Unit	
	Keith Walker	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5-8 and 10-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-8 and 10-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remarks

The amendment to Claim 6 has overcome the rejection under 35 USC 112; however, the claim is now objected to as stated below.

Claims 15 & 16 are new and Claims 1, 3, 5-8, 10-16 are pending examination.

Claim Objections

Claim 6 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 5. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 3, 5 & 6 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,773,837. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the patent and the instant application encompass the same scope. Both fuel cell systems have a compressor, a pressure control valve located after the fuel cell and a gas flow and pressure control means.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 & 7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Support is not found for "First controlling said compressor to change an amount of the cathode gas supplied to the fuel cell at a start of a transition period..." The specification only appears to support the limitation "changing an amount of the supply gas by said compressor during the transition period of said fuel cell, and thereafter, changing the opening of said pressure control valve," which is not seen to be an equivalent limitation as presently claimed.

Claims 1 & 7 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for "an airflow control means to control the compressor based on a target power generation amount" [0021], does not reasonably provide enablement for the broad scope of any general controlling of the compressor. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. A compressor can be controlled by many means, manual or in response to a condition, and the conditions can also be many, for instance, altitude and temperature can decrease the oxygen density. Applicant does not have support for the broad scope of any type of controlling of the compressor.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 10-14 & 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The time relationship between "a start of a transition period" and "at an initial stage of the transition period" is unclear, which is the first function, the "start" or the "initial" part.

Claims 1, 3, 7 & 10-16 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Evidence that these claims fail to correspond in scope with that which applicant(s) regard as the invention can be found in the reply filed 1/9/06. In that paper, applicant

has stated "the claimed invention first controls the compressor to change the amount of the cathode gas supplied to the fuel cell at a start of a transition period of the fuel cell, and thereafter changes the opening of the pressure control valve depending on the amount of the changed cathode gas", and this statement indicates that the invention is different from what is defined in the claim(s) because as discussed in the specification and claimed in claims 10-14 the first control is to the pressure control valve, closing the opening so that the compressor can catch by increasing the air flow and then at such a time as the compressor has caught up the pressure control valve is opened so as to avoid a build-up of pressure.

Claim 3, 5 & 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim is drawn to an apparatus, a fuel cell system, and also has limitations to the methods of operating the fuel cell system. It is held that a single claim, which claims both an apparatus and the method steps of using the apparatus, is indefinite. The mixing of the two statutory classes renders the claims indefinite because a clear line of infringement is not established for the public (MPEP 2173.05).

All claims depending from claims rejected under 35 USC 112 are also rejected for the same.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 3, 5, 6, 7, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Merritt et al. (US 5,366,821).

In general, Merritt et al. disclose a method and apparatus for providing a substantially constant output voltage from a fuel cell notwithstanding output current variations (see abstract). The reference is concerned with providing a substantially constant voltage even when its load current varies (col. 4, lines 48-51) and optimizing the oxygen utilization ratio according to the transient power output of the fuel cell to improve efficiency (col. 3, lines 59-65).

Merritt et al. disclose a fuel cell system (see Figure 2) that comprises a fuel cell 10, which generates power to a variable load 152 by supplying anode gas 112, cathode gas 162 (air) into the fuel cell and a compressor 330 (see Figure 3) that controls the amount of air to be supplied into the cathode side of the fuel cell and a pressure control valve 180 (see Figure 4) *that controls* the air pressure of the fuel cell and which is provided on downstream of the cathode side of the fuel cell (see abstract; col. 8, lines 38-44; col. 9, line 24 to col. 10, line 27; col. 11, line 32 to col. 12, line 45). The air flow controls means in the form of a flow calculator (see Figure 4) controls the airflow toward the cathode inlet side to be a target airflow amount corresponding to the target power generation amount (the required pressure) of the fuel cell by controlling the speed of the

compressor which controls the revolution number of the motor that drives the speed of the compressor (col. 9, lines 24-46; col. 11, lines 46-67 and col. 12, lines 1-44).

If the flow rate of the oxidant is to be increased during the transition period of the fuel cell, the desired mass flow rate is implemented and maintained by changing the size of the flow control valve 180 until the flow calculator 349 (the air pressure control means) determined that the desired mass flow has been achieved and any subsequent deviation from the desired mass flow rate is similarly detected at the mass flow transducer 358 and remedied by the flow calculator 340 through the command signal 389 to the flow control valve 180 (col. 10, lines 20-27). During the stationary state of the fuel cell, the mass flow rate of the reactant gas is regulated by the flow control valve 180 at the cathode gas output of the fuel cell and the flow calculator, which is responsive primarily to the fuel cell output current and secondarily to the mass flow rate measured at the cathode gas input, actuates the flow control valve 180 (col. 5, lines 60-68).

During a transition period of the fuel cell such as when the output current of the fuel cell has changed, the flow rate of the oxidant gas can be increased without decreasing its pressure and the variable-flow control valve 180 is opened until the transducer 358 detects that the desired mass flow rate has been obtained and since an uncompensated increase in the mass flow rate would be accompanied by a pressure drop, any resulting tendency toward a pressure drop will be met by increasing the speed of the motor 332 sufficiently to restore the set point pressure of the oxidant gas supply which changes the amount of air supplied by the compressor during the transition

period (col. 12, lines 1-25). As can be seen in this section of the reference, changing the opening of the valve during the transition period changes the pressure of the oxidant gas stream as well as the flow rate of the oxidant gas stream through the fuel cell. The speed or the revolution number of the compressor also inherently controls the amount of airflow into the cathode inlet side of the fuel cell because it pumps the air from an air source or supply into the cathode inlet side of the fuel cell.

After the motor 332 to the compressor is adjusted, the mass flow rate is again changed slightly as monitored by sensor 358 and the valve 180 is adjusted to restore the flow rate through the transducer 344 (col. 12, lines 25-28). Column 12, lines 25-28 of the reference clearly disclose changing the amount of cathode gas supplied to the fuel cell by the compressor during the transition period and thereafter changing the opening of the pressure control valve 180. A change in the motor speed operating the air compressor changes the airflow rate, which is also the mechanism by which pressure is changed (col. 9, lines 44-55). When the opening of the control valve 180is adjusted to compensate for the changes of the amount of cathode gas due to the adjustment of airflow made by the compressor, the pressure is restored to the original pressure (the target pressure).

Hence it can be seen during the transition period of the fuel cell, the feedback steps of maintaining the flow amount of air to a prescribed value and a pressure of the air to a prescribed value are stopped while the system is being configured such that successive perturbations of the pressure control and mass flow control will be smaller and smaller (air pressure control means during the transition period is kept operating

until the airflow amount reaches the target value and the air pressure control means during the transition period is kept operating until the airflow amount reaches the target air flow amount) and a new state of operation (the stationary state with no load current variation) at the new mass flow rate and the original pressure (the target pressure) will be quickly achieved after the transition state is over (col. 12, lines 29-33).

Finally, as seen in Figure 1 of applicant's present specification, the flow valve 8A is located downstream of the cathode side of the fuel cell and the compressor 7B is located upstream of the cathode side of the fuel cell. The flow valve 180 of Merritt is similarly located downstream of the cathode side of the fuel cell and the compressor 330 is located upstream of the cathode side of the fuel cell and both the flow valve 180 and compressor 330 inherently control the pressure and flow rate of the oxidant gas through the fuel cell as recited in the instant claims because the location of the flow valve 180 is identical to the location of the flow valve 8 A shown in Figure 1 of the present specification and the location of the compressor is identical to the location of the compressor 7B shown in Figure 1 of the present specification. Although the semantics of the Merritt et al. reference may be slightly differently from that claimed in the instant claims, the processes claimed are inherently disclosed by the fuel cell system of Merritt et al. when Figures 1-4 of Merritt are compared to Figure 1 of the present application as to the location of the flow valve downstream of the oxidant side of the fuel cell and the location of the compressor upstream of the oxidant side of the fuel cell.

The amount of power generated from the fuel cell is changed during the transition period as the gas flow amount to the cathode is gradually adjusted to the

target value discussed above that is maintained during the new stationary state such that the power is not changed.

Merritt also clearly discloses controlling the amount of cathode gas (air) supplied by a compressor during a transition period of the fuel cell due to current load variations that require more or less oxygen in the fuel cell and corresponding more or less output power which is directly related to the increase or decrease of the current of the electrical output of the fuel cell stack as measured by current transducer 362 (col. 10, lines 27-36). Even though the voltage is maintained to be substantially constant, the output current is not and therefore the output power is also varied due to variations in the current output. One of ordinary skill in the art is familiar with the power equation given by P (power) = V(voltage) x I (current).

Furthermore, Merritt states the required mass flow rate of the oxidant gas through the stack 10 and thus through the mass flow transducer 358 is determined by the flow calculator which is primarily responsive to the current signal of the current transducer (col. 10, lines 1-5). Merritt also states that both the compressor and the valve 180 are used to set the new mass flow rate and maintaining a pressure after the transition period is over (col. 12, lines 1-28).

Moreover, Merritt states that increasing the mass flow rate by using valve 180 causes a pressure drop if the increase in the mass flow rate is not compensated (col. 12, lines 13-21). The pressure is compensated by adjusting the air flow supplied by the compressor which also inherently changes the mass flow rate (col. 12, lines 21-26).

Adjusting or controlling the variable valve 180 inherently adjusts the pressure as well as the mass flow rate of the oxidant through the fuel cell. As seen in Figure 1 of applicant's present specification, the flow valve 8A is located downstream of the cathode side of the fuel cell and the compressor 7B is located upstream of the cathode side of the fuel cell. The flow valve 180 of Merritt is similarly located downstream of the cathode side of the fuel cell and the compressor 330 is located upstream of the cathode side of the fuel cell and both the flow valve 180 and compressor 330 inherently controls the pressure and flow rate of the oxidant gas through the fuel cell as recited in the instant claims because the location of the flow valve 180 is identical to the location of the flow valve 8 A shown in Figure 1 of the present specification and the location of the compressor is identical to the location of the compressor 7B shown in Figure 1 of the present specification. Although **the semantics** of the Merritt et al. reference may be slightly differently from that claimed in the instant claims, the processes claimed are inherently disclosed by the fuel cell system of Merritt et al. when Figures 1-4 of Merritt are compared to Figure 1 of the present application as to the location of the flow valve downstream of the oxidant side of the fuel cell and the location of the compressor upstream of the oxidant side of the fuel cell.

Finally, as seen in Figure 5 of the instant application, the opening of the backpressure control valve is not done in one step after changing the airflow amount by the compressor. The opening of the backpressure control valve is coordinated with the change in the airflow amount provided by the compressor.

Response to Arguments

Applicant's arguments filed 1/9/2006 have been fully considered but they are not persuasive.

Applicant argues Merritt does not teach first changing the compressor speed then changing the valve as pointed to in Merritt (12:6-24). While the reference does teach this process of operation, Merritt also teaches changing the system pressure first by ramping up the compressor and then changing the variable flow valve to allow the increase in air volume (12:30-40).

Allowable Subject Matter

Claims 10-14 & 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The closest prior art of record, Merritt does not disclose, teach or suggest the distinguishing feature of the opening of the pressure control valve for controlling the pressure of the cathode gas is decreased at an initial stage of the transition period and thereafter the opening of the pressure control valve is increased following an increase of the cathode gas flow amount.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KW
Keith Walker

TRACY DOVE
PRIMARY EXAMINER
3/04